



Contribution ID: 412

Type: Oral presentation

Nonperturbative infrared finiteness in super-renormalisable scalar quantum field theory

Wednesday, July 28, 2021 2:00 PM (15 minutes)

Scalar ϕ^4 theory in three dimensions with fields in the adjoint of $SU(N)$ is of interest as holographically dual to a model for inflationary cosmology. The theory is perturbatively IR divergent but it was proposed in the past that its dimensionful coupling constant plays the role of the IR regulator nonperturbatively. Using a combination of Markov-Chain-Monte-Carlo simulations of the lattice-regularised theory, both frequentist and Bayesian data analysis, and considerations of a corresponding effective theory we gather evidence that this is indeed the case. We will briefly discuss the implications this potentially has for holographic cosmology.

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Session Classification: Theoretical developments and applications beyond particle physics

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